

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : CANON INC

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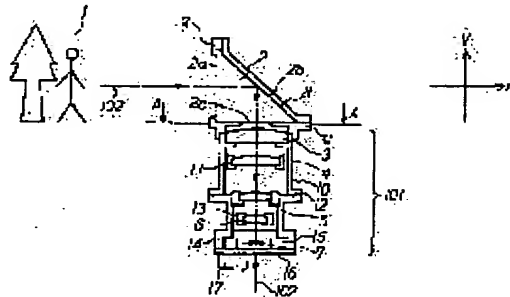
(72)Inventor : TANAKA HIDETOMO

## (54) IMAGE PICKUP DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To facilitate photographing operation by shortening the length of a whole device in a horizontal direction by attaching a prism body having a slant face reflecting and deflecting a luminous flux as an inside surface reflection surface on the object side of a photographing system and picking up images through the prism body.

SOLUTION: The prism body 2 has the slant face 2b as a reflection surface and is provided on the object side of the photographing system 101 on an optical axis. The luminous flux from an object 1 on the optical axis 102 is made incident from an incident plane 2a constituted of a plane, and is reflected and deflected by 90 degrees by the slant face 2b and is emitted from a light exit surface 2c constituted of the plane. The luminous flux in the horizontal direction equivalent to the optical axis 102 from the object 1 is made incident from the incident plane 2a of the prism body 2, and is reflected and deflected by 90 degrees (perpendicular direction) by the reflection surface 2b, and is emitted from the light exit surface 2c and is made incident on the photographing system 101. Then, a subject image is formed on the surface of an image pickup means 7 by the photographing system 101. Thus, a photographing luminous flux is deflected by 90 degrees, so that it is made thin in the horizontal direction when it is attached at a camera main body by shortening the length in the horizontal direction as the photographing system.



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CLAIMS

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[Claim(s)]

- [Claim 1] Image pick-up equipment characterized by equipping the body side of a photography system with the prism object which made the slant face which carries out the reflective deviation of the flux of light the internal reflection side, and picturizing through this prism object.
- [Claim 2] Image pick-up equipment characterized by equipping with the prism object which makes the slant face which carries out the reflective deviation of the flux of light into the optical path of a photography system an internal reflection side, and has refractive power in optical plane of incidence or/, and an optical injection side, and picturizing through this prism object.
- [Claim 3] The optical plane of incidence of the aforementioned prism object or/, and an optical injection side are image pick-up equipment of the claim 1 characterized by having refractive power.
- [Claim 4] The claims 1 and 2 or 3 image pick-up equipment which are characterized by having prepared the shading mask the optical plane of incidence of the aforementioned prism object or/, and near the optical injection side.
- [Claim 5] For the light-receiving side configuration of the aforementioned image pick-up means, the opening configuration of the aforementioned shading mask is image pick-up equipment of the claim 4 characterized by being abbreviation similarity.
- [Claim 6] Image pick-up equipment of the claim 2 characterized by moving the lens group prepared in the body [ of the aforementioned prism object ], and image surface side on an optical axis, and performing variable power.
- [Claim 7] The aforementioned prism object is the claim 1 or the image pick-up equipment of 2 characterized by carrying out the reflective deviation of the flux of light on the optical axis of the aforementioned photography system 90 degrees.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] Concerning image pck-up equipment, this invention is set up so that the photography direction and the direction of a photographic subject (the direction of a normal and the direction of a photographic subject of an image pck-up means side) of a photography person may have a predetermined angle in a video camera, 35mm film camera, etc., and it attains the miniaturization of the whole equipment.

[0002]

[Description of the Prior Art] When a photography system is established horizontally, a photographic subject is located in the method of the optical-axis kickback of a photography system, and it is made for an image pck-up side to be located behind [ optical-axis top ] a photography system with image pck-up equipments, such as the conventional video camera and 35mm film camera. That is, it constitutes so that a photographic subject, a photography system, and an image pck-up side may be located on a straight line.

[0003]

[Problem(s) to be Solved by the Invention] Conventionally, what was miniaturized as image pck-up equipment is demanded. However, a photographic subject, a photography system, and the image pck-up equipment constituted so that an image pck-up side might be located on a straight line serve as the sum of the distance to the electronic circuit board tooth back where the horizontal length of the whole image pck-up equipment equips with a solid state image pickup device from the optical overall length and image pck-up side of a photography system also as the shortest.

[0004] Moreover, if the main optical system of a photography system has the move lens group for variable power and focuses (focal lens group), it is necessary to make a move lens group move in the direction of an optical axis by the electric means. In this case, usually, actuators, such as a stepping motor, must be carried, and, for the reason, the horizontal direction of the whole equipment projects further rather than the wearing substrate tooth back of a solid state image pickup device, consequently the horizontal overall length of image pck-up equipment increases further.

[0005] When this image pck-up equipment was carried in main parts, such as a video camera, the length of the direction which connects a photographic subject and a photography system (objective lens) increased, and there was a trouble that it became very difficult to make the whole equipment small.

[0006] this invention attains shortening of the horizontal length of the whole equipment, and aims at offer of the image pck-up equipment which made photography operation easy.

[0007]

[Means for Solving the Problem] The image pck-up equipment of this invention equips the body side of a photography (1-1) system with the prism object which made the slant face which carries out the reflective deviation of the flux of light the internal reflection side, and is characterized by picturizing through this prism object.

[0008] Equip with the prism object which makes the slant face which carries out the reflective

deviation of the flux of light into the optical path of a photography (1-1-1) system especially an internal reflection side, and has refractive power in optical plane of incidence or/, and an optical injection side, and picturize through this prism object.

[0009] (1-1-2) The optical plane of incidence of the aforementioned prism object of composition (1-1) or/, and the optical injection side should have refractive power.

[0010] (1-1-3) Prepare the shading mask the optical plane of incidence of the aforementioned prism object or/, and near the optical injection side.

[0011] (1-1-4) The light-receiving side configuration of the aforementioned image pck-up means of the opening configuration of the aforementioned shading mask should be abbreviation similarity.

[0012] (1-1-5) Move the lens group prepared in the body [ of the aforementioned prism object ], and image surface side on an optical axis, and perform variable power.

[0013] (1-1-6) The aforementioned prism object should carry out the reflective deviation of the flux of light on the optical axis of the aforementioned photography system 90 degrees. It is characterized by \*\*.

[0014]

[Embodiments of the Invention] Drawing 1 is the important section cross section of the operation gestalt 1 of this invention. One is a photographic subject among drawing. 101 is a photography system and is arranged towards the perpendicular direction V which made the optical axis 102 intersect perpendicularly to a horizontal direction H. 2 is a prism object, made slant-face 2b the reflector, and has prepared it in the body side on the optical axis of the photography system 101. And the flux of light on the optical axis 102 from a photographic subject 1 is made to inject from injection side 2c which is made to carry out incidence, is made to carry out a reflective deviation 90 degrees by slant-face 2b, and consists of plane-of-incidence 2a which consists of a flat surface from a flat surface.

[0015] In addition, although the projection optical path is bent 90 degrees with the prism object 2 with this operation gestalt, it is not necessary to be necessarily 90 degrees, and the angle of slant-face 2b is adjusted and it is [ \*\*\*\*\* / except 90 degrees ] good.

[0016] 8 is prism covering, and it is performing protection against dust and shading while it presses down the prism object 2 in the prism frame 9 direction. The prism frame 9 holds the prism object 2. It has the zoom lens of the rear focus formula which consists of four lens groups of the lens group 6 which moves on an optical axis in order to perform amendment of the image surface change accompanying the variable power held at the lens group 5 of the fixation held at the lens group 4 for the variable power held at the lens group 3 of the fixation by which the photography system 101 was held at the fixed lens-barrel 10, and the move ring 11, and the afocal ring 12, and the move ring 13, and a focus. 14 is a relay electrode holder, holds the afocal ring 12 and is carrying out connection fixation with the fixed lens-barrel 10.

[0017] 7 is an image pck-up means, consists of CCD (solid state image pickup device) etc., and is located in the image formation side of the photography system 101. 15 is a CCD electrode holder and includes the image pck-up means 7. 16 is an electronic circuit board, is carrying out fixed maintenance of the image pck-up means 7 and the CCD electrode holder 15, and is being fixed to the edge of the relay electrode holder 14. 17 is a focal motor and is making the lens group 6 for a focus drive in the direction of an optical axis. In addition, the lens group 4 and the lens group 6 are moved by the motor (un-illustrating), and variable power is performed.

[0018] Drawing 4 is the A-A cross section of drawing 1. The prism frame 9 had opening 9a of the light-receiving side of the image pck-up means 7, and the rectangle of abbreviation similarity, and has doubled the relative position of the rectangular side. 9b is a gobo (shading mask), has the function which shades the flux of lights other than the effective flux of light of the prism object 2, and is the prism object 2 and really fabricating it. In addition, gobo 9b may consist of a prism frame 9 and an another object. Moreover, you may arrange a gobo between the plane-of-incidence 2a side of the prism object 2, or the lens group 3 and the lens group 4.

[0019] With this operation gestalt, from plane-of-incidence 2a of the prism object 2, incidence of the horizontal flux of light which is equivalent to an optical axis 102 from a photographic subject 1 is carried out, and it carries out a reflective deviation in the direction (perpendicular direction)

of 90 degrees in reflector 2b, is injected from injection side 2c, and is carrying out incidence to the photography system 101. And it is made to form a photographic subject image on the 7th page of an image pick-up means by the photography system 101. Thus, the horizontal direction when shortening the horizontal length as a photography system and equipping the main part of a camera is made thin by arranging the prism object 2 ahead of the photography system 101, and deflecting the photography flux of light 90 degrees.

[0020] Moreover, since the prism object is used without using a plane mirror in order to deflect the photography flux of light, the ghost who arises by light with the large degree of incident angle can be made small, or can be lost.

[0021] Drawing 2 is the important section cross section of the operation gestalt 2 of this invention. The same sign is given to the same element as the element shown by drawing 1 in drawing 2.

[0022] Using the prism object 18 with the refractive power which this operation gestalt deleted [ refractive power ] the lens group 3 of fixation compared with the operation gestalt 1 of drawing 1, instead made the refractive power of the lens group 3 share with plane-of-incidence 3a of the prism object 3 and injection side 3c differs from pressing [ in the prism frame 9 ]-down by a part of fixed lens-barrel 10-prism object 18 \*\*, and other composition is the same.

[0023] With this operation gestalt, the same effect as the operation gestalt 1 has been acquired by the above composition.

[0024] Drawing 3 is the important section cross section of the operation gestalt 3 of this invention. The same sign is given to the same element as the element shown by drawing 1 in drawing 3.

[0025] This operation gestalt deletes the prism object prepared in the method of the optical-axis kickback of the photography system 101 compared with the operation gestalt 1 of drawing 1. Instead, make refractive power share the lens group 5 of fixation with plane of incidence and a injection side respectively, constitute from a prism object 19 with the refractive power which made the slant face the reflector, and it arranges between the lens group 4 of the photography system 101, and the lens group 6. Carrying-out-90 degrees-the reflective deviation of optical path \*\*s differ, and other composition is the same.

[0026] With this operation gestalt, the lens groups 4 and 6 are moved on an optical axis, and variable power is performed. in addition -- while 20 is prism covering in drawing 3 and pressing down the prism object 19 in the fixed lens-barrel 10 and the relay electrode holder 14 -- protection against dust -- and it is shading 21 is a zoom motor and is making the lens group 4 drive in the direction of an optical axis.

[0027] With this operation gestalt, a photography system, as a result horizontal thickness of a camera are made thin by the above composition.

[0028]

[Effect of the Invention] According to this invention, shortening of the horizontal length of the whole equipment can be attained as mentioned above, and the image pick-up equipment which made photography operation easy can be attained.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The important section cross section of the operation gestalt 1 of this invention

[Drawing 2] The important section cross section of the operation gestalt 2 of this invention

[Drawing 3] The important section cross section of the operation gestalt 3 of this invention

[Drawing 4] The A-A cross section of drawing 1

[Description of Notations]

1 Photographic Subject

2, 18, 19 Prism object

101 Photography System

7 Image Pick-up Means

9b Shading mask

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(71) 出願人 000001007

キヤノン株式会社

東京都大田区下丸子3丁目30番2号

(72) 発明者 田中 秀知

東京都大田区下丸子3丁目30番2号 キヤ  
ノン株式会社内

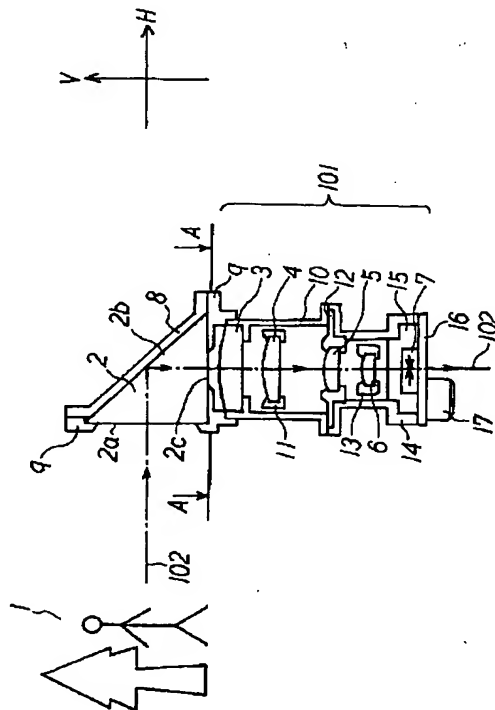
(74) 代理人 弁理士 高梨 幸雄

(54) 【発明の名称】 撮像装置

(57) 【要約】

【課題】 光路折り曲げ用のプリズム体を用いて撮影系の水平方向の長さを短縮し、装置全体の小型化を図った撮像装置を得ること。

【解決手段】 撮影系の物体側に光束を反射偏向させる斜面を内面反射面としたプリズム体を装着し、該プリズム体を介して撮像していること。



**【特許請求の範囲】**

【請求項1】 撮影系の物体側に光束を反射偏向させる斜面を内面反射面としたプリズム体を装着し、該プリズム体を介して撮像していることを特徴とする撮像装置。

【請求項2】 撮影系の光路中に光束を反射偏向させる斜面を内面反射面とし、且つ光入射面又は／及び光射出面に屈折力を有するプリズム体を装着し、該プリズム体を介して撮像していることを特徴とする撮像装置。

【請求項3】 前記プリズム体の光入射面又は／及び光射出面は屈折力を有していることを特徴とする請求項1の撮像装置。

【請求項4】 前記プリズム体の光入射面又は／及び光射出面近傍に遮光マスクを設けていることを特徴とする請求項1、2又は3の撮像装置。

【請求項5】 前記遮光マスクの開口形状は前記撮像手段の受光面形状とは略相似であることを特徴とする請求項4の撮像装置。

【請求項6】 前記プリズム体の物体側と像面側に設けたレンズ群を光軸上移動させて変倍を行っていることを特徴とする請求項2の撮像装置。

【請求項7】 前記プリズム体は前記撮影系の光軸上の光束を90度反射偏向させていることを特徴とする請求項1又は2の撮像装置。

**【発明の詳細な説明】****【0001】**

【発明の属する技術分野】 本発明は撮像装置に関し、例えばビデオカメラや35mmフィルムカメラ等において撮影者の撮影方向と被写体方向（撮像手段面の法線方向と被写体方向）とが所定の角度を有するように設定し、装置全体の小型化を図ったものである。

**【0002】**

【従来の技術】 従来のビデオカメラや35mmフィルムカメラ等の撮像装置では撮影系を水平方向に構えたときに、撮影系の光軸上前方に被写体が位置し、撮影系の光軸上後方に撮像面が位置するようにしている。即ち、被写体と撮影系、そして撮像面が一直線上に位置するように構成している。

**【0003】**

【発明が解決しようとする課題】 従来より、撮像装置としては小型化されたものが要望されている。しかしながら被写体と撮影系、そして撮像面が一直線上に位置するように構成した撮像装置は撮像装置全体の水平方向の長さが最短としても撮影系の光学全長と撮像面から固体撮像素子を装着する電装基板背面までの距離の和となる。

【0004】 又、撮影系の主光学系が変倍と焦点調節用の移動レンズ群（フォーカスレンズ群）を有しているならば、電気的手段により移動レンズ群を光軸方向に進退させる必要がある。その場合には、通常、ステッピングモーター等のアクチュエーターを搭載しなければならず、その為、装置全体の水平方向が更に固体撮像素子の

装着基板背面よりも突出してきて、この結果、撮像装置の水平方向の全長が更に増加してくる。

【0005】 この撮像装置を、例えばビデオカメラ等の本体に搭載する場合には、被写体と撮影系（対物レンズ）とを結ぶ方向の長さが増加し、装置全体を小型にするのが大変難しくなるという問題点があった。

【0006】 本発明は、装置全体の水平方向の長さの短縮化を図り、撮影操作を容易にした撮像装置の提供を目的とする。

**【0007】**

【課題を解決するための手段】 本発明の撮像装置は、

（1-1）撮影系の物体側に光束を反射偏向させる斜面を内面反射面としたプリズム体を装着し、該プリズム体を介して撮像していることを特徴としている。

【0008】 特に、

（1-1-1）撮影系の光路中に光束を反射偏向させる斜面を内面反射面とし、且つ光入射面又は／及び光射出面に屈折力を有するプリズム体を装着し、該プリズム体を介して撮像していること。

【0009】 （1-1-2）構成（1-1）の前記プリズム体の光入射面又は／及び光射出面は屈折力を有していること。

【0010】 （1-1-3）前記プリズム体の光入射面又は／及び光射出面近傍に遮光マスクを設けていること。

【0011】 （1-1-4）前記遮光マスクの開口形状は前記撮像手段の受光面形状とは略相似であること。

【0012】 （1-1-5）前記プリズム体の物体側と像面側に設けたレンズ群を光軸上移動させて変倍を行っていること。

【0013】 （1-1-6）前記プリズム体は前記撮影系の光軸上の光束を90度反射偏向させていること。等、を特徴としている。

**【0014】**

【発明の実施の形態】 図1は本発明の実施形態1の要部断面図である。図中、1は被写体である。101は撮影系であり、その光軸102を水平方向Hに対して直交させた垂直方向Vに向けて配置している。2はプリズム体であり、斜面2bを反射面とし、撮影系101の光軸上の物体側に設けている。そして被写体1からの光軸102上の光束を平面より成る入射面2aより入射させ、斜面2bで90度反射偏向させて平面より成る射出面2cより射出させている。

【0015】 尚、本実施形態ではプリズム体2により投影光路を90度折り曲げているが、必ずしも90度である必要はなく、斜面2bの角度を調整して90度以外としても良い。

【0016】 8はプリズムカバーであり、プリズム体2をプリズム枠9方向に押えると共に防塵及び遮光を行っている。プリズム枠9はプリズム体2を保持している。

撮影系101は固定鏡筒10に保持された固定のレンズ群3、移動環11に保持された変倍用のレンズ群4、アフォーカル環12に保持された固定のレンズ群5、そして移動環13に保持された変倍に伴う像面変動の補正とフォーカスを行う為に光軸上移動するレンズ群6の4つのレンズ群より成るリヤフォーカス式のズームレンズを有している。14はリレーホルダーであり、アフォーカル環12を保持し、固定鏡筒10と接続固定している。

【0017】7は撮像手段であり、CCD（固体撮像素子）等から成っており、撮影系101の結像面に位置している。15はCCDホルダーであり、撮像手段7を包括している。16は電装基板であり、撮像手段7とCCDホルダー15を固定保持しており、リレーホルダー14の端部に固定されている。17はフォーカスモーターであり、合焦用のレンズ群6を光軸方向に駆動させている。尚、レンズ群4とレンズ群6をモーター（不図示）で移動させて変倍を行っている。

【0018】図4は図1のA-A断面図である。プリズム枠9は撮像手段7の受光面と略相似の矩形的開口部9aを有し、矩形的辺の相対位置を合わせている。9bは遮光板（遮光マスク）であり、プリズム体2の有効光束以外の光束を遮光する機能を有しており、プリズム体2と一体成形している。尚、遮光板9bをプリズム枠9と別体で構成しても良い。又、遮光板をプリズム体2の入射面2a側又はレンズ群3とレンズ群4との間に配置しても良い。

【0019】本実施形態では被写体1からの光軸102に相当する水平方向の光束はプリズム体2の入射面2aより入射し、反射面2bでの90度方向（垂直方向）に反射偏向して、射出面2cより射出して、撮影系101に入射している。そして撮影系101により撮像手段7面上に被写体像を形成するようにしている。このようにプリズム体2を撮影系101の前方に配置して撮影光束を90度偏向させることにより撮影系としての水平方向の長さを短縮してカメラ本体に装置したときの水平方向を薄くしている。

【0020】又撮影光束を偏向する為に平面鏡を用いずにプリズム体を用いているので入射角度が大きい光により生じるゴーストを小さくしたり無くすることができる。

【0021】図2は本発明の実施形態2の要部断面図である。図2において図1で示した要素と同一要素には同符号を付している。

【0022】本実施形態は図1の実施形態1に比べて固定のレンズ群3を削除し、その代わりにレンズ群3の屈折力をプリズム体3の入射面3aと射出面3cに分担させた屈折力のあるプリズム体18を用いていること、固定鏡筒10の一部でプリズム体18をプリズム枠9に押えていること、が異なっており、その他の構成は同じである。

【0023】本実施形態では以上のような構成により実施形態1と同様の効果を得ている。

【0024】図3は本発明の実施形態3の要部断面図である。図3において図1で示した要素と同一要素には同符号を付している。

【0025】本実施形態は図1の実施形態1に比べて撮影系101の光軸上前方に設けたプリズム体を削除し、その代わりに固定のレンズ群5を入射面と射出面に各々屈折力を分担させ、斜面を反射面とした屈折力のあるプリズム体19より構成して撮影系101のレンズ群4とレンズ群6との間に配置して、光路を90度反射偏向させていること、が異なっており、その他の構成は同じである。

【0026】本実施形態ではレンズ群4、6を光軸上移動させて変倍を行っている。尚、図3において20はプリズムカバーであり、プリズム体19を固定鏡筒10及びリレーホルダー14に押えると共に防塵及び遮光している。21はズームモーターであり、レンズ群4を光軸方向に駆動させている。

【0027】本実施形態では以上のような構成により撮影系、ひいてはカメラの水平方向の厚さを薄くしている。

#### 【0028】

【発明の効果】本発明によれば以上のように、装置全体の水平方向の長さの短縮化を図り、撮影操作を容易にした撮像装置を達成することができる。

#### 【図面の簡単な説明】

【図1】本発明の実施形態1の要部断面図

【図2】本発明の実施形態2の要部断面図

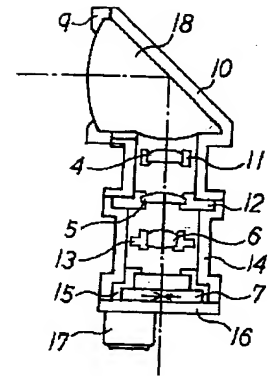
【図3】本発明の実施形態3の要部断面図

【図4】図1のA-A断面図

#### 【符号の説明】

- 1 被写体
- 2, 18, 19 プリズム体
- 101 撮影系
- 7 撮像手段
- 9b 遮光マスク

【図 2】



【图 4】

